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The Reciprocal and Indirect Relationships between Passive Facebook use, Comparison on Facebook, and Adolescents' Body Dissatisfaction

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Abstract

Facebook has been found to provide a fertile ground for social comparison. Emerging evidence indicates that social comparison may mediate the relationship between Facebook use and young people's body dissatisfaction. Yet, little work has been done on how these relationships evolve over time in adolescence and no study has examined the reciprocal relationships between passive Facebook use, social comparison, and adolescents' body dissatisfaction. To examine these reciprocal relationships, two-wave panel data (N_{Time1} = 1,840) gathered among adolescents (ages 12-19) were analyzed. Cross-lagged structural equation models indicated that passive Facebook use at Time 1 predicted increases in boys' comparison on Facebook at Time 2. Comparison on Facebook at Time 2, in turn, was associated with more body dissatisfaction at Time 2. In addition, body dissatisfaction at Time 1 predicted increases in comparison on Facebook at Time 2. Comparison on Facebook at Time 2, in turn, was related to more passive Facebook use at Time 2, but less passive Facebook use over time. No gender differences were found for these opposite pathways. The discussion focuses on the explanation and understanding of these findings.

Keywords: passive Facebook use, comparison on Facebook, body dissatisfaction, adolescence

The Reciprocal and Indirect Relationships between Passive Facebook use, Comparison on Facebook, and Adolescents' Body Dissatisfaction

1. Introduction

During the adolescent years, teens become more and more attentive to the changes that occur to their bodies (e.g., Steinberg, 2005). Due to these changes, the intensity of body dissatisfaction (i.e., the subjective negative evaluation of one's figure or body parts) increases throughout this developmental period (e.g., Bucchianeri, Arikian, Hannan, Eisenberg, & Neumark-Sztainer, 2013). Given that body dissatisfaction is one of the most important risk factors for eating disorders and related health outcomes in adolescence (e.g., Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006), it is critical to understand factors that contribute to adolescents' body dissatisfaction.

Several studies suggest that the media are important risk factors for adolescents' body dissatisfaction (e.g., Grabe, Ward, & Hyde, 2008). While the majority of these studies focused on the impact of traditional media (e.g., television and magazines) on adolescents' body image, less is known about the impact of social networking sites (SNSs). However, SNSs, such as Facebook, are relevant to consider, given their important role in adolescents' lives (Lenhart, 2015; Van Waeg, Van Hoecke, Demeulenaere, & D'hanens, 2016). Research indicates that on any given day, almost six in ten American teens use social media, spending an average of approximately 2 h doing so (Rideout, 2015), with Facebook being the most popular social networking site (SNS) among American (Lenhart, 2015) and Belgian (Van Waeg et al., 2016) adolescents.

Facebook not only allows users to easily share photos and videos with their network of friends, Facebook especially allows users to easily browse through others' profiles, without any interaction being required. Studies have shown that individuals engage more in such passive Facebook use or "the monitoring of other people's lives by viewing the content

of others' profiles without direct exchanges between the users" (Frison & Eggermont, 2015, p. 4), than in active Facebook use (Pempek, Yermolayeva, & Calvert, 2009; Tobin, Vanman, Verreynne, & Saeri, 2014; Verduyn et al., 2015).

The primary aim of the present study is to investigate whether passive Facebook use is reciprocally related to adolescents' body dissatisfaction, through comparison on Facebook. Although various studies assume that Facebook affords users various opportunities for social comparison (Cramer, Song, & Drent, 2016; Haferkamp & Krämer, 2011; Vogel, Rose, Roberts, & Eckles, 2014), and suggest an important underlying role of comparison behaviors on Facebook in the relationship between Facebook usage and young people's body image concerns (Fardouly & Vartanian, 2015; Tiggeman & Slater, 2013), important gaps remain.

First, no research to date has investigated the reciprocal relationships between passive Facebook use, comparison on Facebook, and adolescents' body dissatisfaction. To fill this gap in the literature, the present study applied a longitudinal design. This design not only allows for insights into the predictive influence of passive Facebook use on adolescents' body dissatisfaction six months later, but also increases understanding of the direction of these relationships. In addition, exploring these opposite indirect pathways is especially important as, based on previous cross-sectional studies (e.g., Blechert, Nickert, Caffier, & Tuschen-Caffier, 2009; Cramer et al., 2016), reciprocity is likely to occur.

Second, we currently know little about the indirect relationships between passive Facebook use, comparison on Facebook, and adolescents' body dissatisfaction, as the majority of prior research focused on college students. It is however critical to identify risk factors of body dissatisfaction in this developmental period, given adolescents' increased focus on changes in the body (Steinberg, 2005), and their presence on social media (e.g., Lenhart, 2015; Van Waeg et al., 2016). The current study therefore investigated these relationships among an adolescent sample.

1.1. Passive Facebook Use, Comparison on Facebook, and Body Dissatisfaction

First, social comparison theory (Festinger, 1954) was used as the theoretical framework for understanding the relationship between passive Facebook use and adolescents' comparison on Facebook. Social comparison theory argues that there is a drive within individuals to evaluate abilities and opinions. People gain such self-evaluations through comparison to similar others, i.e., individuals who are similar in ability or opinion. However, individuals may also choose a dissimilar other for comparison. Research has documented that one can assimilate or contrast oneself relative to superior or inferior others, referred to as upward and downward comparison respectively (see Corcoran, Crusius, & Mussweiler, 2011, for a review). Both comparison directions have been related to different social comparison motives: Upward social comparisons are typically motivated by a desire for self-improvement, whereas downward social comparisons are generally motivated by a desire for self-enhancement (e.g., Halliwell & Dittmar, 2005; Knobloch-Westerwick, 2015).

In addition, several studies suggest that Facebook affords users various tools for social comparison (Haferkamp & Krämer, 2011; Vogel et al., 2014). Cramer et al. (2016) confirms this suggestion by showing that almost 70% of American college students engage in social comparison on Facebook. Also, research showed that female high school Facebook users made more appearance comparisons than non-users (Meier & Gray, 2014). In line with these studies, cross-sectional research found support for a positive relationship between Facebook use and college students' social comparison behaviors (Fardouly & Vartanian, 2015; Jang, Park, & Song, 2015; Lee, 2014). For example, Fardouly and Vartanian (2015) found that Facebook usage (i.e., number of logins and time spent on Facebook) positively predicted young women's Facebook appearance comparisons in general. Lee (2014) showed that Facebook use intensity was associated with college students' social comparison frequency on Facebook.

Although previous studies focused on general Facebook use (e.g., time spent on Facebook), we believe that passive Facebook use may particularly account for this impact of Facebook use on young people's social comparison tendency. Passive Facebook use refers to exposure to the content of others' profiles, such as status updates, photos, and videos. Given that passive Facebook use requires no interaction with the profile owner, it is this type of Facebook use that allows easy access to elements that are ideal for social comparison. We therefore expect that passive Facebook use in particular may stimulate social comparison behaviors on Facebook. In line with social comparison theory (Festinger, 1954) and based on prior cross-sectional research (Fardouly & Vartanian, 2015; Lee, 2014), we hypothesize that:

H1: Passive Facebook use at Time 1 will positively predict adolescents' comparison on Facebook at Time 2.

Second, sociocultural models of body image, such as the tripartite influence model (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999), argue that when individuals frequently compare their own appearance to the appearance of others, body dissatisfaction can develop. The relationship between social appearance comparison and body dissatisfaction has been confirmed cross-sectionally (e.g., Myers & Crowther, 2009) and longitudinally (Rodgers, McLean, & Paxton, 2015). Studies, however, have shown that upward appearance comparisons (i.e., comparing oneself to someone whom they believe to be better off) in particular may result in negative body image (e.g., Myers, Ridolfi, Crowther, & Ciesla, 2012). In line with studies focusing on upward comparison, Eyal and Te'eni-Harari (2013) showed that self-improvement motivations were linked to higher levels of body dissatisfaction, through body shape discrepancy.

We expect that a similar impact might be at play in a Facebook context. With regard to Facebook, scholars suggest that comparison behaviors on this particular SNS are particularly likely to be upward (e.g., Frison & Eggermont, 2016b; Harrison & Hefner, 2014).

This assumption is based on the fact that Facebook users have a tendency to edit their profile picture in accordance with societal ideals of attractiveness (Vogel et al., 2014). Scholars argue that visual content, such as profile pictures, can be easily edited and "selectively presented to feature the self in the most favorable manner" (e.g., untagging oneself in unflattering photos) (Cramer et al., 2016, p. 740). Hence, Facebook functions as a platform where everyone tend to present an ideal version of the self, which makes upward comparisons on Facebook especially likely.

Correlational studies examining the relationship between social comparison behaviors on Facebook and individuals' body image revealed that comparison on Facebook negatively affects one's body satisfaction (Fardouly & Vartanian, 2015; Smith, Hames, & Joiner, 2013). For instance, Fardouly and Vartanian (2015) found that Facebook appearance comparisons positively predicted young women's body image concerns. In addition, Smith et al. (2013) reported that Facebook-related social comparisons predicted increases in female college students' body dissatisfaction. Therefore, building on the tripartite influence model (Thompson et al., 1999), and in line with previous correlational studies (Fardouly & Vartanian, 2015; Smith et al., 2013), we expect that:

H2: Comparison on Facebook at Time 1 will positively predict adolescents' body dissatisfaction at Time 2.

1.2. Opposite Relationship

Although we hypothesized that comparison on Facebook predicts body dissatisfaction, it is also possible that initial levels of body dissatisfaction might spur adolescents to alter their appearance, and to engage in comparison behaviors on Facebook. Adolescence is a time when body image awareness is at its peak (Lindberg, Grabe, & Hyde, 2007). Several factors, such as physical maturation and onset of dating and sexual interactions, contribute to this appearance-centered focus in adolescence (Natsuaki, Biehl, &

Ge, 2009). Scholars indicate that this appearance-centered focus can result in cognitive biases, such as paying more attention to appearance-related information (see Williamson, Muller, Reas, & Thaw, 1999, for a review), and can prompt individuals to wonder how their appearance compares to others (Lindner, Tantleff-Dunn, & Jentsch 2012).

According to uses and gratification theory (Katz, Haas, & Gurevitch, 1973), individuals actively select media to satisfy their psychological needs. Building on the assumptions of this theory, it could be that body dissatisfaction inspires adolescents to compare themselves to idealized peers in the media with the aim of self-improvement. This possibility of a reversal of causal direction would be supported by self-improvement literature (Zillmann & Bryant, 1985), which suggests that individuals can use social appearance comparisons to improve their selves on a particular aspect (Buunk & Gibbons, 2007; Nabi & Keblusek, 2014). Given that SNSs, such as Facebook, provide adolescent users an ideal media platform for social comparisons with peers (e.g., Fox & Moreland, 2015; Haferkamp & Krämer, 2011), it is likely to expect that adolescents with higher levels of body dissatisfaction will be especially inclined to engage in comparison on Facebook.

In line with this reasoning, prior research indicates that women with high levels of body dissatisfaction are more inclined to engage in appearance-related comparison than women low in body dissatisfaction (Blechert et al., 2009; Trampe, Stapel, & Siero, 2007). Similarly, Bessenoff (2006) suggests that women high in body image self-discrepancy are more likely to engage in upward appearance-related comparison, and, in turn, are more likely to think about weight-reduction behaviors. We therefore hypothesize that:

H3: Body dissatisfaction at Time 1 will positively predict adolescents' comparison on Facebook at Time 2.

We hypothesized that passive Facebook use precedes comparison on Facebook; however, we have also reasons to expect an opposite pathway, in which comparison on

Facebook would lead to less passive Facebook use. Although adolescents may initially derive hope and feel motivated to attain an ideal body when comparing themselves with idealized imagery (i.e., upward comparison) (Knobloch-Westerwick, 2015), after some time, repeated comparison to ideal images may decrease perceptions that the ideal is attainable (Holland & Tiggemann, 2016). Due to the fact that the displayed 'ideal images' are perceived as unattainable, repeated upward comparisons can have a self-deflating impact in the long run (Lockwood & Kunda, 1997). Applying this reasoning to a Facebook context, we expect that repeated comparison on Facebook may enhance adolescent users' perception that the ideal is unattainable, which may lead adolescents to avoid passive Facebook use. In line with this expectation, Cramer et al. (2016) showed that motives of self-improvement (which are linked to upward comparison) diminish college students' intentions to use Facebook. We therefore hypothesize that:

H4: Comparison on Facebook at Time 1 will negatively predict adolescents' passive Facebook use at Time 2.

1.3. Gender Differences

Prior research has shown that females spent more time looking at the SNS pages of same-sex others (e.g., McAndrew & Jeong, 2012), are more likely to use SNSs for comparing themselves with others (e.g., Haferkamp, Eimler, Papadakis, & Kruck, 2012), and report greater levels of body dissatisfaction (e.g., Bearman et al., 2006). Despite these gender differences, studies examining the moderating role of gender in the relationship between media use and adolescents' well-being have reported inconsistent findings.

On the one hand, several studies argue that gender plays an important role in explaining the effects of mass media (e.g., Hargreaves & Tiggeman, 2004) on body dissatisfaction, as well as in the relationship between social comparison and adolescents' well-being (e.g., Nesi & Prinstein, 2015). For instance, Hargreaves and Tiggeman (2004)

showed that exposure to idealized appearance in mass media was related to increased body dissatisfaction among girls, but not among boys. On the other hand, other studies suggest that gender plays no significant role in the relationships between media use, social comparison, and body dissatisfaction (de Vries, Peter, de Graaf, & Nikken, 2016; Steers, Wickham, & Acitelli, 2014). For instance, de Vries et al. (2015) found no support for a moderating role of gender in the association between SNS use and adolescents' body dissatisfaction.

Given that no study thus far investigated whether the reciprocal and indirect relationships between passive Facebook use, comparison on Facebook, and adolescents' body dissatisfaction differ between boys and girls, the present study will explore the moderating role of gender in the hypothesized associations.

2. Method

2.1. Sample and Participant Selection

This study draws on two-wave panel data with an interval of six months (Time 1 = March 2014; Time 2 = October 2014). These data are from a larger longitudinal panel study on the relationships between adolescents' Facebook use and well-being. Data were gathered among 12- to 19-year-old adolescents, from 15 randomly selected Flemish high schools (i.e., the northern part of Belgium), which were located in different regions and which offered different types of schooling levels. During regular school hours, participants filled out paper-and-pencil questionnaires. Approval for the study procedures was received from the institutional review board of the host university. Informed consent was obtained in line with the customary guidelines in Belgium.

Importantly, some students that participated at Time 1 did not participate anymore at Time 2, because they moved between Time 1 and Time 2 (i.e., during summer vacation) to a new class or school. In addition, other students only participated at Time 2, but not at Time

1, because they moved between Time 1 and Time 2 to a school that already agreed to participate in the study. Due to these changes, some respondents dropped out the study, whereas others joined the study. As a result of these changes during Time 1 and Time 2, 1,840 adolescents participated at baseline; 1,577 participated at Time 2, and 1,235 students participated at both time points (67% of the first wave).

The analytical sample consisted of those participants that had a Facebook account at Time 1 or Time 2. Thus, we only included the 88% (N_{Time1} = 1,621) of the respondents who had a Facebook account at Time 1 or Time 2 in our analyses. At Time 1, 52% of the participants were boys and the mean age was 14.76 years (*SD* = 1.41). Using Pillai's Trace, a multivariate analysis of variance with all baseline variables as dependent variables showed that there were no significant differences between those who participated in both waves and those who participated in one wave, $V = .00$, $F(5, 1500) = 1.34$, $p = .25$; $\eta p^2 = .00$.

2.2. Measures

Control variables. First, participants indicated whether they were a boy (= 1) or a girl (= 2). Second, we questioned how much time participants spent, on average, on Facebook on a regular *weekday*, *Wednesday*, *Friday*, and *weekend day*. Items were rated on an 11-point Likert scale, ranging from *0 hours* (= 1) to *I am always logged in to Facebook* (= 11). We distinguished Wednesdays from regular weekdays, because participants then have a half day at school. A composite score of daily time spent on Facebook was computed by calculating the average of the time spent on these days. Third, we assessed participants' life satisfaction using the five-item Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985), as life satisfaction has been found to significantly correlate with both comparison on Facebook (Frison & Eggermont, 2016b) and body satisfaction (McFarland & Petrie, 2012). Participants evaluated five items (e.g., "I am satisfied with my life") ($\alpha_{Time\ 1}$ =

.90) on a seven-point Likert scale (1 = *Strongly Disagree*; 7 = *Strongly Agree*). An estimate of participants' life satisfaction was created by averaging the item scores.

Passive Facebook use. To measure participants' passive Facebook use, we used the Passive Facebook Use Subscale of the Multidimensional Scale of Facebook Use (Frison & Eggermont, 2015). Using a seven-point Likert scale, which ranged from *never* (= 1) to *several times per day* (= 7), participants rated five passive Facebook activities (e.g., "How often do you watch photos of a Facebook friend"). In line with Frison and Eggermont (2015), we decided to exclude the item "How often do you read your news feed", because this item has been shown to load highly on another type of Facebook use (i.e., active private Facebook use) in previous studies (Frison & Eggermont, 2015; 2016a). To validate the hypothesized single factor structure of the four-item passive Facebook use subscale, confirmatory factor analyses (CFA) were run. Results from a first CFA (i.e., items that measured passive Facebook use at Time 1) revealed an acceptable fit: $\chi^2(1) = 26.98$, $p < .001$, GFI = .99; CFI = .99; AGFI = .92. Similarly, a second CFA (i.e., items that measured passive Facebook use at Time 2) showed that the measurement model yielded an acceptable fit: $\chi^2(1) = 33.84$, $p < .001$, GFI = . 99; CFI = .99; AGFI = .90. In addition, a reliability analysis showed a Cronbach's alpha of .87 (= $\alpha_{\text{Time 1}}$) and . 88 (= $\alpha_{\text{Time 2}}$). To estimate participants' passive Facebook use at Time 1 and Time 2, we calculated their mean scores.

Comparison on Facebook. The question used in the study of Lee (2014) was used to assess the frequency of social comparison on Facebook. Participants were asked: "I often compare myself with others on Facebook when I am reading news feeds or checking others' photos". This question was measured using a five-point Likert scale (*Strongly disagree* (= 1) – *Strongly agree* (= 5)).

Body dissatisfaction. The Body Dissatisfaction Subscale of the Body Attitude Test (Probst, Vandereycken, Van Coppenolle, & Vanderlinden, 1995) was used to measure

participants' body dissatisfaction. Using a five-point Likert scale from *Strongly Disagree* (= 1) to *Strongly Agree* (= 5), participants evaluated four items (e.g., "I envy others for their physical appearance"). CFA were performed to validate the original scale's structure (i.e., single factor). Results from a first CFA (i.e., items that assessed body dissatisfaction at Time 1) indicated that the measurement model fitted the data well: $\chi^2(2) = 7.71$, $p < .05$, CFI = 1; GFI = 1; AGFI = .99. Similarly, a second CFA (i.e., items that measured body dissatisfaction at Time 2) showed that the measurement model yielded a good fit: $\chi^2(2) = 24.23$, $p < .001$, CFI = .99; AGFI = .96. In addition, a reliability analysis showed a Cronbach's alpha of .87 (= $\alpha_{\text{Time 1}}$) and . 88 (= $\alpha_{\text{Time 2}}$). By averaging the item scores, an estimate of adolescents' body dissatisfaction was created.

2.3. Analyses

Structural equation modelling (AMOS) using the maximum likelihood method was used to test our hypothesized model. The chi-squared to degrees of freedom ratio (χ^2/df), the root mean square error of approximation (RMSEA), and the comparative fit index (CFI) were used to evaluate the fit of the model (Byrne, 2010).

We estimated a mediated cross-lagged model in which all variables at Time 2 were predicted by their preceding values at Time 1, and by the value of the respective independent variable at Time 1. We controlled for participants' gender, age, average daily time spent on Facebook, and life satisfaction by allowing covariances with each other and the exogenous variables in the model, and by estimating predictive paths from them to all endogenous variables in the model. We estimated covariances between variables measured at the same time point and allowed covariances between the measurement errors of the same indicators.

Mediation was tested using a bootstrapping analysis (Cheung & Lau, 2007). Given that the bootstrapping method does not allow the sample to include missing values, multiple imputation was performed (Honaker & King, 2010). We used the SPSS multiple imputation

process to generate five imputed data sets based on the available data. These five imputed data sets were subsequently analyzed using the AMOS bootstrapping procedure (i.e., 1000 bootstrap samples; 95% confidence interval [CI]).

Next, we conducted a multiple group comparison test to examine whether the hypothesized model differed for boys and girls. We used the χ^2-model comparison test value to evaluate whether the unconstrained model (i.e., model in which all structural paths are allowed to vary among boys and girls) significantly differed from the constrained model (i.e., model were the relationships were fixed to be equal among boys and girls). If $\Delta \chi^2$ was significant, path-by-path analyses were performed in which we compared the unconstrained model with the model where the hypothesized relationship was constrained to be equal for both groups.

3. Results

Descriptive statistics for all relevant variables are presented in Table 1.

Table 1

Descriptive Statistics

	Min	Max	M (SD)
1. Passive FB use (T1)	1	7	3.78 (1.39)
2. Passive FB use (T2)	1	7	3.87 (1.41)
3. Comparison on FB (T1)	1	5	2.33 (1.08)
4. Comparison on FB (T2)	1	5	2.35 (1.10)
5. Body dissatisfaction (T1)	1	5	2.49 (1.04)
6. Body dissatisfaction (T2)	1	5	2.49 (1.02)
7. Time spent on FB (T1)	1	11	5.01 (2.89)
8. Life satisfaction (T1)	1	7	4.87 (1.39)

Note. FB = Facebook; T1 = Time 1; T2 = Time 2; N_{Time1}= 1,621

Zero-order correlations for all relevant variables are presented in Table 2.

Table 2

Zero-Order Correlations

	1	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Gender (T1)	**1**	-.14**	.08**	ns	.30**	.32**	.42**	.39**	.18**	-.14**
2. Age (T1)		**1**	.13**	ns	.05*	ns	.05*	ns	ns	ns
3. Passive FB use (T1)			**1**	.65**	.25**	.19**	.16**	.13**	.47**	-.08**
4. Passive FB use (T2)				**1**	.17**	.23**	.11**	.15**	.35**	ns
5. Comparison on FB (T1)					**1**	.55**	.44**	.36**	.14**	-.24**
6. Comparison on FB (T2)						**1**	.43**	.44**	ns	-.22**
7. Body dissatisfaction (T1)							**1**	.70**	.12**	-.41**
8. Body dissatisfaction (T2)								**1**	.11**	-.35**
9. Time spent on FB (T1)									**1**	-.13**
10. Life satisfaction (T1)										**1**

Note. Gender: male = 1 and female = 2; FB = Facebook; ns = non-significant; T1 = Time 1; T2 = Time 2;

N_{Time1}= 1,621

*p < .05; **p < .01

3.1. Hypothesized Model

The model, presented in Figure 1, yielded a chi-square value of 761.97 with 158 degrees of freedom, $p < .001$. The chi-square statistic, however, presents several problems (Byrne, 2010); for instance, for models with large sample sizes (i.e., 400 or more), the chi-square index is almost always statistically significant. Given our large sample size, we relied on alternative measures of model fit. These model fit statistics revealed that the model fitted the data well: RMSEA = .05; CFI = .97; $\chi^2/df = 4.82$.

First, as expected, passive Facebook use at Time 1 was unrelated to body dissatisfaction at Time 2, $p > .05$. However, passive Facebook use at Time 1 was positively related to comparison on Facebook at Time 1, $\beta = .20$, $B = .17$, $SE = .03$, $p < .001$, and comparison on Facebook at Time 2, $\beta = .10$, $B = .08$, $SE = .02$, $p < .05$. Comparison on Facebook at Time 2, in turn, was positively associated with body dissatisfaction at Time 2, $\beta = .14$, $B = .13$, $SE = .02$, $p < .001$. However, comparison on Facebook at Time 1 was unrelated to body dissatisfaction at Time 2, $p > .05$.

The bootstrapping method (1000 bootstrap samples, maximum likelihood bootstrap, 95% CI) revealed that the relationship between passive Facebook use at Time 1 and body dissatisfaction at Time 2 was mediated by comparison on Facebook at Time 2, CI = [.013, .045], $SE = .01$, $p = .001$, but not by comparison on Facebook at Time 1, $p > .05$.

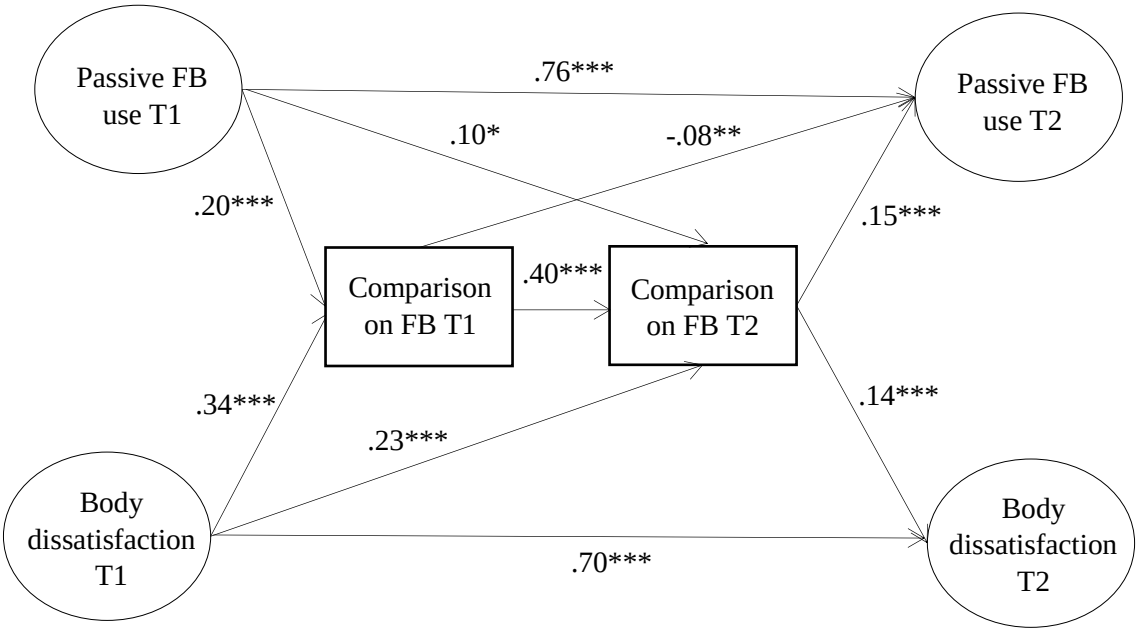
Second, regarding the opposite relationships, results showed, in line with our expectations, that body dissatisfaction at Time 1 was unrelated to passive Facebook use at Time 2, $p > .05$. However, body dissatisfaction at Time 1 was positively related to comparison on Facebook at Time 1, $\beta = .34$, $B = .46$, $SE = .04$, $p < .001$, and to comparison on Facebook at Time 2, $\beta = .23$, $B = .31$, $SE = .04$, $p < .001$. Comparison on Facebook at Time 2, in turn, was positively associated with passive Facebook use at Time 2, $\beta = .15$, $B = .17$, $SE = .03$, $p < .001$. However, comparison on Facebook at Time 1 negatively predicted passive Facebook use at Time 2, $\beta = -.08$, $B = -.09$, $SE = .03$, $p < .01$.

In addition, the bootstrapping procedure showed that the relationship between body dissatisfaction at Time 1 and adolescents' passive Facebook at Time 2 was significantly mediated by adolescents' comparison on Facebook at Time 2, CI = [.005, .039], $SE = .01$, $p < .01$, but not by comparison on Facebook at Time 1, $p > .05$.

Third, the multiple group comparison test revealed that the hypothesized model differed for boys and girls, $\Delta \chi^2(21) = 46.20$, $p = .001$. A path-by-path analysis [$\Delta \chi^2(1) =$

8.26, $p < .01$] revealed that passive Facebook use at Time 1 positively predicted boys' comparison on Facebook at Time 2, $\beta = .23$, $B = .16$, $SE = .03$, $p < .001$, but not girls' comparison on Facebook at Time 2, $p > .05$.

Figure 1. Model examining the relationships between passive Facebook use, comparison on Facebook, and adolescents' body dissatisfaction.



Note: Values reflect standardized coefficients. Ovals represent latent constructs. For clarity of presentation, covariances, control variables, observed indicators, and error terms are not shown.

FB = Facebook

*$p < .05$; **$p < .01$; ***$p < .001$

4. Discussion

Although recent studies showed that Facebook use is related to young people's body dissatisfaction trough comparison on Facebook (Fardouly & Vartanian, 2015), very little work has been done on how these relationships evolve over time in adolescence, and none

has examined the reciprocal relationships between passive Facebook use, social comparison, and body dissatisfaction. Our study sought to address these gaps. Drawing on social comparison theory (Festinger, 1954) and the tripartite influence model (Thompson et al., 1999), we predicted that adolescents who use Facebook in a passive manner would develop a stronger tendency to engage in social comparison on Facebook, and thus experience higher levels of body dissatisfaction, and vice versa. This prediction seemed to be partially supported and is further discussed below.

4.1. Facebook Use Indirectly Predicts Adolescents' Body Dissatisfaction

For boys, we observed that the relationship between passive Facebook use and body dissatisfaction was mediated by comparison on Facebook. This finding aligns with previous research, indicating that more Facebook use prompts greater social comparison, which, in turn, negatively influences men's body image (e.g., drive for thinness [Kim & Chock, 2015]; self-perceived physical attractiveness [de Vries & Kühne, 2015]).

For girls, we found no support for an indirect relationship between passive Facebook use, comparison on Facebook, and body dissatisfaction, as passive Facebook use did not predict girls' comparison on Facebook over time. This finding is in contrast with findings of previous correlational research (Fardouly & Vartanian, 2015). A plausible explanation is that girls are more likely to make appearance-related comparisons (Kim & Chock, 2015; Haferkamp & Krämer, 2011; Hargreaves & Tiggeman, 2004), increasing the likelihood that they experience actual-ideal body discrepancies (e.g., Fardouly, Dietrichs, Vartanian, & Halliwell, 2015). Consequently, to cope with these stressful body-image situations it stands to reason that girls apply an avoidant coping strategy, for instance minimizing social comparisons on Facebook (e.g., Cash, Santos, & Williams, 2005).

A second explanation for the fact that comparison on Facebook mediates the relationship between passive Facebook use and body dissatisfaction among boys, but nog

among girls, relates to gender differences in adolescents' appearance contingent self-worth (Homan & Tylka, 2015). More specifically, because boys' self-worth is less rooted in appearance (Levine & Smolak, 2002), upward comparisons on Facebook are probably less threatening to their self-concept. Hence, boys may be less inclined to generate counterarguments in response to idealized images on Facebook and are therefore more susceptible to the negative influence of (upward) comparison on Facebook (e.g., McLean, Paxton, & Wertheim, 2013).

To summarize, we speculate that girls, more than boys, engage in self-inspirational appearance-related social comparison on Facebook, resulting in attempts to change and/or accentuate their bodies toward the observed ideals (e.g., Knobloch-Westerwick & Crane, 2012). From a short-term perspective, such inspiring-evoking comparisons might produce positive affect, in that they inspire girls to attain an ideal body, and prevent girls from experiencing the self-deflating impact that follows from appearance-focused upward comparisons (e.g., negative emotions caused by a perceived mismatch between the actual and ideal self [Higgins, 1987]). In support of this reasoning, girls' passive Facebook use at Time 1 was positively related with social comparison on Facebook at Time 1. Yet, as girls actually engage in self-improvement behaviors, in hopes for a more ideal appearance, most will likely realize that they are unable to match the idealized images on Facebook, and experience negative affect. Given that media users have been found to avoid content that produces negative feelings (Johnson & Knobloch-Westerwick, 2014), this might explain why girls' passive Facebook use did not predict increases in comparison on Facebook over time.

Furthermore, although we evidenced a cross-sectional relationship between adolescents' comparison and body dissatisfaction, no short-term longitudinal relationship between these variables emerged. Results showed that adolescents' comparison on Facebook was not predictive of increases in body dissatisfaction over time. A plausible explanation for

this null finding is related to the fact that adolescents' body dissatisfaction has its roots in a host of biopsychosocial forces. Thus, there may be other unmeasured factors that might have played a more important role in the connection between comparison on Facebook and adolescents' body dissatisfaction (e.g., changes in self-esteem; Kim & Park, 2016).

4.2. Body Dissatisfaction Indirectly Predicts Adolescents' Facebook Use

For boys and girls, results confirmed our expectations and showed that body dissatisfaction positively predicted comparison on Facebook. Hence, we can cautiously suggest that body dissatisfied adolescents engage in comparison behaviors on Facebook for self-improvement purposes (e.g., offline comparison; Rodgers et al., 2015). That is, adolescents might use Facebook content as a source of information on how to improve their physical appearance and may compare with idealized online peers in order to set a standard to live up to. In line with this assumption, Knobloch-Westerwick (2015) indicated that individuals can reinforce their self-concept and minimize negative self-esteem –in this case negative self-perceptions of attractiveness– through selectively attending to particular media content. Thus adolescents can turn feelings of body dissatisfaction into motivations to change physical characteristics, and, in doing so, produce a drive for self-improvement. In turn, self-improvement motivations lead adolescents to compare themselves with others who are better off, such as idealized peers on Facebook (e.g., Halliwell & Dittmar, 2005; Knobloch-Westerwick, 2015). Facebook thus offers adolescents an ideal platform to fulfill these self-improvement motives. Not only because Facebook allows users to compare with idealized peers, but especially because most of these idealized peers are similar in terms of age, sex, etc., as research has shown that the majority of adolescents' Facebook network consists of peers known from the offline world (Manago, Taylor, & Greenfield, 2012).

In addition, results revealed that comparison on Facebook was positively associated with adolescents' passive Facebook use at the same time. This finding aligns with the idea

that self-improvement desires motivate individuals to seek comparison targets who are superior on the dimension under evaluation (e.g., physical appearance), but are similar on surrounding dimensions or dimensions that are involved in the comparison but are not the focal dimension under evaluation (e.g., age). For instance, if adolescents are evaluating their physical appearance, they not only compare their physical appearance with that of others, they also take surrounding dimensions into account, such as whether the other is a professional model. With respect to Facebook, online peers are usually similar on surrounding dimensions (e.g., age, no professional models, no plastic surgery), yet superior on the appearance dimension, as most users have the tendency to edit their profile picture in accordance with societal appearance ideals. Hence, social comparison on Facebook may be especially inspiring and encouraging, because due to observed similarities with online peers, adolescents may infer that they too can improve their physical appearance and become attractive. Thus, by comparing themselves with online peers, adolescents may immediately derive hope and feel inspired, resulting in higher levels of Facebook use.

For boys, the current study findings possibly point to a reinforcing spiral of Facebook use and body dissatisfaction (Slater, 2007): (1) Passive Facebook use positively influences comparison on Facebook and body dissatisfaction, and (2) these behaviors and cognitions positively influence passive Facebook use. It should be noted, however, that the positive reciprocal relationship between passive Facebook use and body dissatisfaction was mediated through comparison on Facebook at T2, but not through comparison on Facebook at Time 1. Hence, research with more than two time points is needed to further explore whether the indirect relationship between passive Facebook use and body dissatisfaction is mutually reinforcing over time.

Furthermore, results demonstrated that comparison on Facebook negatively predicted adolescents' passive Facebook use over time (i.e., six months later). This finding supports

our notion that repeated exposure to idealized profile pictures on Facebook may decrease one's perception that the ideal is attainable. Given that the attainability of the displayed 'ideal images' influences whether upward comparisons have a self-deflating or inspiring impact (Lockwood & Kunda, 1997), repeated comparisons on Facebook will have a self-deflating impact and eventually lead adolescents to avoid Facebook. In support of this reasoning, Wood (1989) argued that, in cases of low perceived attainability, individuals may forgo the self-improvement benefits of upward comparisons and aim for self-enhancement by avoiding, rather than selecting, comparison targets.

4.3. Limitations

Although this study is among the first to explore the indirect relationships between passive Facebook use, comparison on Facebook, and adolescents' body dissatisfaction, the results of this study should be viewed in light of its limitations. First, the study was limited by its self-report design. Although self-report questionnaires are the most appropriate tools to assess individuals' subjective experiences, such as comparison on Facebook and adolescents' body dissatisfaction, future studies could benefit from combining self-report measures with more objective methods to measure adolescents' Facebook use (e.g., monitoring software; Junco, 2013) to limit shared method variance.

Second, although the longitudinal design is an important strength of the present study, this design was limited by the fact that our hypothesized indirect relationships were tested with data gathered at two time points with a relatively short time interval (i.e., six months). We therefore recommend that future studies should replicate our findings with data gathered at more than two time points, using a longer time interval (e.g., one year).

A third limitation of the present study refers to the use of Lee's (2014) single-item measure to assess participants' comparison on Facebook. Although several studies have relied on single-item measures to assess social comparison with media models (Clay,

Vignoles, & Dittmar, 2005), upward and downward comparison on Facebook (Vogel et al., 2014), and frequency of social comparison on Facebook (Lee, 2014), recent studies assessed social comparison on Facebook using multi-item measures (e.g., Cramer et al., 2016). Given that single-item measures are more vulnerable to random measurement errors and unknown biases in meaning and interpretation, we therefore recommend that future research should employ these multi-item measures for social comparison on Facebook.

4.4. Conclusion

Despite these limitations, the current findings provide valuable insights into how a specific type of Facebook use (i.e., passive Facebook use) can contribute to adolescents' body dissatisfaction. We believe that our findings extend prior research in at least two important ways. First, the present two-wave panel study demonstrated a reciprocal dynamic between passive Facebook use, comparison on Facebook, and adolescents' body dissatisfaction. Although social comparison is almost inevitable when using Facebook, the observed reciprocal pathway leads to the tentative conclusion that body dissatisfied adolescents also deliberately seek out comparison on Facebook, possibly with the aim of self-improvement. Second, we demonstrated the important role of adolescents' gender in the relationship between passive Facebook use and comparison on Facebook, as passive Facebook was positively related to comparison on Facebook over time among boys, but not among girls. This finding hereby adds to our knowledge about individual differences in comparison on Facebook and its consequences for body satisfaction.

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